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**Systematic and Statistical Errors Associated with Nuclear Decay Constant Measurements Using the Counting Technique**[1] DAVID KOLTICK, HAOYU WANG, SHIH-CHIEH LIU, JORDAN HEIM, JONATHAN NISTOR, Purdue University — Typical nuclear decay constants are measured at the accuracy level of $10^{-2}$. There are numerous reasons: tests of unconventional theories, dating of materials, and long term inventory evolution which require decay constants accuracy at a level of $10^{-4}$ to $10^{-5}$. The statistical and systematic errors associated with precision measurements of decays using the counting technique are presented. Precision requires high count rates, which introduces time dependent dead time and pile-up corrections. An approach to overcome these issues is presented by continuous recording of the detector current. Other systematic corrections include, the time dependent dead time due to background radiation, control of target motion and radiation flight path variation due to environmental conditions, and the time dependent effects caused by scattered events are presented. The incorporation of blind experimental techniques can help make measurement independent of past results. A spectrometer design and data analysis is reviewed that can accomplish these goals.

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